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USE OF TEMPLATES FOR COST-EFFECTIVE SECURE
LINKING OF VIDEO STREAM OBJECTS

Yakov Kamen

Leon Shirman

This patent is a continuation in part of U.S. Patent Applications 09/389,916, 09/390,047 and 09/390,044, each filed September 3, 1999, each of which incorporated herein by reference.

Background of the Invention

It is known in the art to annotate or "mark" objects in a video stream with an interactive link. For example, suppose one was watching a video program of an automobile race, and there were several racing cars shown driving around a track. Also suppose that these cars were marked with interactive links. This means that one can position a cursor over the image of one of the cars and click on the image (or alternatively, click on special icons associated with the car). This causes the system controlling the video screen to take a predetermined action (e.g. execute a software program, or initiate some other event such as a telephone call) or display information that is linked to that image. This link can be in the form of a pop-up window for note annotation. (A pop-up window for note annotation is a small window that appears on the screen so that a user can write a small note. It is like an electronic "post-it" note.) Alternatively, the link can be in the form of a URL. If the link is invoked, the system will display a web page depicting information concerning the car or driver that has been

1 clicked on. For example, the system can display details concerning the driver. As
2 mentioned above, by clicking on the icon or image, one could also initiate an action, e.g.
3 a telephone call to a merchandise company to buy a memorabilia product related to what
4 has been clicked on.

5 During annotation, an area or region within the video frames surrounding the
6 image of an object of interest (in the above-mentioned example, the racing car) is
7 established as an “active area.” If one moves the cursor into the active area and clicks,
8 one will initiate an action or invoke the link corresponding to the object within that active
9 area. Typically, an object associated with the active area moves about the video screen
10 during a video clip. For example, a video clip of an automobile race shows a group of
11 cars moving about a racetrack, and these cars typically move about a television screen
12 during the clip as the race proceeds. In such a video clip, a car might move from the right
13 side of the video screen to the left side of the video screen. Thus, the active area must
14 also move across the television screen to keep up with the object of interest. The above-
15 incorporated patent applications pertain to methods for annotating video clips, i.e.
16 defining the active area for each object of interest, and for each frame, in the video clip.
17 These methods permit annotation with a reduced amount of human involvement in the
18 process. It would, however, be desirable to further simplify the process of defining active
19 areas in a video clip.

20

21 Summary

22 A method in accordance with the invention comprises the step of providing a
23 template or a set of templates to be associated with a video screen. The template defines

1 a set of active regions of the video screen. The active regions typically do not overlap
2 one another. Each active region corresponds to a process or link that can be invoked. In
3 one embodiment, the link is to an internet web page. When that link is invoked, the
4 contents of the web page are displayed on the screen.

5 In another embodiment, the link is to a source of information other than an
6 internet web page. For example, the link can cause a video system to display information
7 from a memory to be displayed on the screen. The memory can either be local or non-
8 local.

9 In yet another embodiment, invoking the link causes a software routine or
10 application program to be executed.

11 Alternatively, invoking the link initiates an event, e.g. a telephone call.

12 In one embodiment, the active areas of the template are visible to the user. For
13 example, the active areas of the template can be a particular color, or bear a particular
14 icon, or can be shaded. Thus, the user knows the location of the active areas, and can
15 move a cursor to the active areas to invoke links associated therewith. In another
16 embodiment, the active areas are not visible. However, when the cursor is moved to the
17 active areas, the appearance of the cursor changes, so the user knows that the cursor is
18 positioned over an active area. In yet another embodiment, the active areas are not
19 visible, and the cursor does not change appearance when positioned over the active areas.

20 The video screen can display any type of video information, e.g. a still image, a
21 video image, a web page, a Windows-type desk top output, or other computer output.
22 For example, a user can watch a television program on the video screen and manipulate a
23 cursor to invoke the links associated with the template. Alternatively, the user can read a

1 web page on the video screen and can manipulate a cursor to invoke the links associated
2 with the template.

3 One advantage of this invention is that the use a set of templates is a simple way
4 of providing robust dynamic linking. A person using the template does not have to chase
5 a small moving object on a screen with a cursor in order to invoke a link.

6 A set of templates in accordance with one embodiment of the invention allows a
7 content provider to choose the most appropriate template without complicated content-
8 oriented linking (i.e. without the complication of having the active areas move in sync
9 with associated objects on the video screen). In some cases this solution can be
10 preferable to fixed static icon (one fixed template) solutions and completely dynamic
11 (moving active area) solutions.

12 In accordance with another aspect of the invention, templates can be used for
13 secure communication of data associated with a video stream. For example, in one
14 embodiment, each active area of a template can be considered as a symbol (or letter) that
15 is part of an arbitrary complicated password, which allows a user to be re-directed to
16 selected internet pages, to call a secret telephone number or start a special application.

17 These and other aspects of the invention are described in greater detail below.

18

19 Brief Description of the Drawings

20 Fig. 1 illustrates a video screen including an overlay template comprising a set of
21 active areas.

22 Fig. 2 illustrates a second template overlaying a first template on a video screen.

Fig. 3 is a block diagram illustrating a video system in accordance with the invention.

Detailed Description

Referring to Fig. 1, video system 1 comprises a substantially rectangular video screen 2 having active regions 4a to 4d and a region 6. Regions 4a to 4d correspond to a “template.” Video screen 2 can display any type of visual information. For example, in one embodiment, screen 2 displays a still image, e.g. a picture. In another embodiment, screen 2 displays a movie or television program. In another embodiment, screen 2 displays a web page. In yet another embodiment, screen 2 displays a computer output, e.g. an image of a Windows-type desk top. Screen 2 can be a CRT screen, an LCD screen, a video projection screen, or other type of screen capable of displaying a visual image. The image displayed on screen 2 can originate from a conventional television receiver that receives radio waves or a receiver that receives signals from a cable or optical fiber. Alternatively, the image on screen 2 can originate from the internet, from a personal computer, a VCR, or other source of visual information, either in digital or analog form.

In a first embodiment, regions 4a to 4d are not visually distinguishable from the remainder of screen 2. In other words, if screen 2 is displaying a television program, one cannot tell, merely by looking at screen 2, where regions 4a to 4d are located.

Also shown on screen 2 is a cursor 8. Cursor 8 can be any shape, or have any appearance. A user manipulates cursor 8 with a control device, e.g. a remote controller 10 comprising a joystick, trackball, mouse, touch pad (e.g. touch pad 11a) or appropriate

1 control buttons 11b. If a user moves cursor 8 to region 4a, a link is invoked
2 corresponding to region 4a. If the user moves cursor 8 to region 4b, a link is invoked
3 corresponding to region 4b, and so forth. In one embodiment, the link is to a web page.
4 Moving the cursor to region 4a invokes the link, and information corresponding to the
5 web page is displayed on screen 2. (In an alternative embodiment, one must move cursor
6 8 to region 4a and click on region 4a to invoke the link, rather than merely moving cursor
7 8 to region 4a.)

8 In another embodiment, the link is to a data source other than a web page. This
9 data source could be another source of visual information, e.g. another movie or
10 television program. Alternatively, the link could execute application software.
11 Alternatively, the link could result in the display of data from a local data source, e.g. a
12 disk drive, or a non-local data source. In one embodiment, the link is to a pop-up
13 window for note annotation.

14 As mentioned above, in a first embodiment, regions 4a to 4d are not visible per se.
15 In a second embodiment, when cursor 8 is moved to one of regions 4a to 4d, cursor 8
16 changes appearance (e.g. cursor 8 changes shape, color, light intensity, or otherwise
17 manifests a changed appearance). Thus, a user can determine whether cursor 8 is located
18 in an active region by observing the appearance of cursor 8.

19 In a second embodiment, regions 4a to 4d can be detected visually. For example,
20 regions 4a to 4b can be shaded differently from other portion 6 of screen 2. Thus, a user
21 can still use the entire video screen to watch a video image, but the user will know where
22 the active regions are located. In lieu of shading the active regions differently, a set of

1 lines such as lines 4a' to 4d' are visible so that a user can see where the active regions are
2 located.

3 In a third embodiment, an image is displayed in region 6 of screen 2, but that
4 image is not displayed in active regions 4a to 4d. Thus, regions 4a to 4d can be used to
5 display something other than that image, e.g. other visual information such as icons,
6 alphanumeric information, thumbnail still or video images, and so forth. The images
7 displayed in regions 4a to 4d can come from any appropriate source, e.g. a cable or
8 optical fiber, a conventional television receiver, a computer memory (either local or
9 remote), a VCR or other source of visual information.

10 In this embodiment, regions 4a to 4d can be thought of as containing images
11 interposed over and eclipsing the main image on screen 2. In one embodiment, the
12 images in regions 4a to 4d can be generated using a 3D graphics chip within the video
13 display system. Circuitry for providing the images in regions 4a to 4d can be as
14 described in U.S. Patent Application 09/344,442, filed June 25, 1999. (The '442
15 application discloses means for binding 2D images to a planar surface using a 3D
16 graphics pipeline. The '442 application is incorporated herein by reference.)

17 In a version of the third embodiment, one can adjust the images in regions 4a to
18 4d from being completely opaque to completely transparent, or somewhere in between.
19 In other words, when the images in regions 4a to 4d are completely opaque, any
20 underlying image is completely eclipsed. By rendering regions 4a to 4d more
21 transparent, one can perceive a "ghost image" of the information displayed in regions 4a
22 to 4d along with the underlying image. By rendering regions 4a to 4d completely
23 transparent, one simply sees the underlying image in regions 4a to 4d of screen 2.

1 In a fourth embodiment, regions 4a to 4d display images that periodically change.
2 For example, for thirty seconds, a first thumbnail still or video image appears in region
3 4a, and thereafter, a second image appears in region 4a. After another thirty seconds
4 elapses, a third image appears in region 4a. The link associated with region 4a can
5 change at the same time the image changes. Alternatively, in other embodiments, the
6 link remains unchanged. In one embodiment, invoking the link associated with region 4a
7 alters the image shown in regions 4b to 4d. In another embodiment, invoking the link
8 associated with one region does not affect the images shown in the other active regions.

9 In a fifth embodiment, the size and/or appearance of regions 4a to 4d can be
10 changed, e.g. by actuating appropriate buttons on controller 10. Thus, regions 4a to 4d
11 can be made smaller or larger.

12 In one embodiment, the links associated with regions 4a to 4d are related to the
13 content displayed in region 6. (In this embodiment, the template comprising regions 4a
14 to 4d is typically provided by the content provider of the image shown in region 6.) For
15 example, if region 6 displays a sporting event, regions 4a to 4d might correspond to links
16 for displaying information about that or related sporting events. Thus, if the sporting
17 event is a baseball game, regions 4a to 4d might correspond to links concerning statistics
18 pertaining to the teams or players. In addition, the images depicted in regions 4a to 4d
19 are related to the content displayed in region 6. However, in another embodiment, the
20 images shown at regions 4a to 4d are unrelated to the content displayed in region 6.

21 As mentioned above, regions 4a to 4d form a template. Suppose the image on
22 screen 2 is annotated with links corresponding to active regions 12 and 14. Region 12 is
23 located within region 6 and outside regions 4a to 4d, e.g. by using cursor 8 to click on

1 active region 12. Thus, a user can invoke the link associated with region 12 by using
2 cursor 8 to click on region 12, even though the template is active. However, region 14 is
3 located within region 4c. The template covers active area 14, and the link associated with
4 area 14 cannot be invoked unless one removes the template (e.g. in a manner discussed
5 below). Thus, if one moves cursor 8 to area 14 in an effort to invoke the link associated
6 with area 14, one will only succeed in invoking the link associated with region 4c.

7 As mentioned above, in one embodiment, the image on screen 2 is a video image.
8 This image can be annotated with links in the manner described in the above-
9 incorporated patent applications. In other words, portions of a video image are associated
10 with interactive links. By placing the template over the video image, any links
11 underneath regions 4a to 4d are effectively masked.

12 In another embodiment, the image on screen 2 is a web page. Web pages
13 typically include active areas for invoking links to other web pages. If screen 2 displays
14 a web page, those links appearing within region 6 can be accessed by a user, and invoked
15 in the normal manner. However, those links within regions 4a to 4d are effectively
16 masked, and cannot be invoked by a user unless the template is removed.

17 The template itself is typically stored in a memory device associated with the
18 video system of which screen 2 is part. This memory device can be a semiconductor
19 memory such as a RAM, a ROM, an EPROM, a disk drive, tape drive, or other memory
20 device. This memory stores the location of the active regions 4a to 4d, and the links (e.g.
21 URLs) with which regions 4a to 4d are associated. In one embodiment, the template (e.g.
22 the links associated with active regions 4a to 4d) is determined by the user. In other
23 words, a person viewing screen 2 can determine the links that are associated with regions

1 4a to 4d, e.g. by inputting appropriate link address information into a memory, e.g. with
2 an alphanumeric keypad coupled to video system 1. (The keypad can be part of
3 controller 10 or some other structure coupled to system 1.) The user can activate or
4 deactivate the template.

5 In another embodiment, the template can originate from the same source as the
6 video information displayed on screen 2. For example, if the program displayed on
7 screen 2 originates from a cable TV source, the links associated with active regions 4a to
8 4d also originate from that source. (Optionally, the locations of active regions 4a to 4d
9 within screen 2 can also originate from that source.)

10 In another embodiment, the links can originate from a source that is different from
11 the origin of the image displayed on screen 2. For example, the image on screen 2 can be
12 a conventional television program received from a radio antenna, whereas the links can
13 be obtained via the internet. Optionally, the location of regions 4a to 4d can also be
14 received from the internet.

15 In one embodiment, a user can activate or deactivate the template, e.g. by pressing
16 an appropriate control button on remote control device 10. If deactivated, regions 4a to
17 4d no longer serve as active regions, and any active regions previously masked by
18 regions 4a to 4d become unmasked. Thus, active region 14, previously masked by region
19 4b, can then be clicked on, and the link associated with active region 14 can be invoked.
20 When deactivated, any visual indication of the location of regions 4a to 4d is removed.
21 Thus, if regions 4a to 4d previously had a different appearance, when the template is
22 deactivated, regions 4a to 4d of screen 2 no longer have a different appearance. If, prior
23 to deactivation, cursor 8 had a different appearance when positioned in regions 4a to 4d,

1 when deactivated, cursor 8 no longer takes on a different appearance when positioned in
2 regions 4a to 4d. Regions 4a to 4d are typically activated or deactivated together as a
3 group, e.g. by actuating the above-mentioned control buttons. In another embodiment,
4 regions 4a to 4d can be individually activated or deactivated.

5 A user can also reactivate the template, e.g. by actuating an appropriate control
6 button on remote control device 10. Alternatively, a user can activate a different
7 template, e.g. by actuating an appropriate control button on remote control device 10.
8 This different template can have active regions having shapes and locations that are
9 different from regions 4a to 4d. Also, the links associated with this different template can
10 be to data sources other than the links associated with regions 4a to 4d.

11 A user can also place one template over one or more other templates. For
12 example, referring to Fig. 2, by actuating an appropriate button on controller 10, a user
13 can activate a template having regions 16a to 16d. As can be seen, region 16a entirely
14 covers and masks region 4a. Region 16b is elliptical, and only masks a portion of region
15 4b. Thus, portions of region 4b are still accessible. Region 16c is trapezoidal, but still
16 covers and masks all of region 4c. A user can deactivate the template corresponding to
17 regions 16a to 16d if so desired by actuating an appropriate button on controller 10.

18 In one embodiment, the various templates can be activate, deactivated, and placed
19 over one another by an external source, e.g. the source providing the image in region 6 of
20 screen 2. As indicated above, this image can come from any of a number of places, e.g. a
21 video broadcast using radio waves, optical cable or electrical cable. This image can
22 originate from other sources as well, e.g. the internet. Thus, the provider of this image
23 can determine which templates should be associated with the image at any given time.

1 In one embodiment, a template can be activated for only a predetermined time and
2 then deactivated. Thus, if the image is a quiz show, the active regions can correspond to
3 the answers to a question being asked on the quiz show. The active template might
4 remain active for only so long as the question was pending.

5 In one embodiment, each region 4a to 4d represents an independent link. In
6 another embodiment, one can actuate regions 4a to 4d in different orders to obtain
7 different results. For example, if one clicked on regions 4a, 4b, 4a, 4d, that might
8 constitute a "code" for causing a certain event to occur, or for invoking a certain link.
9 Alternatively, if one clicked on a different sequence of regions, that might cause a
10 different event to occur, or invoke a different link. Templates could be added or
11 removed, depending upon this order. Alternatively, templates could be locked in place or
12 locked out, depending upon this order. (This capability of requiring active areas 4a to 4d
13 to be actuated in a certain order could be used for security purposes, e.g. for permitting or
14 forbidding a user to access certain information, video images or web pages.
15 Alternatively, this capability might also be part of a game, e.g. a user would have to
16 figure out certain clues in order to figure out the correct order in which to actuate
17 regions.)

18 One embodiment of our invention can be practiced using a PC having the
19 following:

- 20 1. A CPU such as a Celeron or Pentium, e.g. as manufactured by Intel, or a K6/K7
21 processor, e.g. as manufactured by Advanced Micro Devices.
- 22 2. 24 MB of memory or greater.

1 3. The operating system can be Windows 95, Windows 98, WinCE, Win2000, or
2 any other operating system that supports Direct X, Direct 3D and/or Direct Draw.

3 These packages can be used to apply images to regions 4a to 4d. The Windows
4 operating system includes a standardized platform called Direct X for Windows.

5 Fig. 3 is a block diagram of a computer system 50 for performing a method in
6 accordance with our invention. Referring to Fig. 3, system 50 comprises a CPU 52, e.g. a
7 Pentium II class CPU, comprising a cache memory 52a, a core 52b and an internal bus
8 52c for facilitating communication between core 52b and cache 52a. Core 52b
9 communicates via a CPU bus 54 to a system controller 56. System controller 56
10 communicates with the system memory 58 via a memory bus 60. System memory 58
11 includes system memory.

12 Also included in system 50 is a PCI bus 62 for facilitating communication
13 between system controller 56 and I/O devices 64, 66 and disk drive 68. I/O device 64
14 can be any type of I/O device, e.g. a modem or telephone for communicating with a
15 telephone line. In one embodiment, I/O device 66 is a video capture card with a driver.
16 The video capture card can be coupled to receive a video program from an antenna, a
17 cable or optical fiber, a VCR, a video disk, or other video signal source. Data from the
18 video capture card is either loaded by DMA (direct memory access) or CPU 52 into a
19 frame buffer, typically within main memory 58. However, the frame buffer may be in
20 other memories within system 50.

21 Graphics controller 70 uses its own local memory 74 to generate and store pixel
22 arrays to be displayed on a video display unit 76.

1 It is emphasized that system 50 is only one example of a system that performs a
2 method in accordance with our invention. Other hardware can be used as well.

3 Stored within a memory within video display system 1 are the locations on screen
4 2 of regions 4a to 4d. CPU 52 (or other logic hardware within system 1) determines
5 whether cursor 8 has been moved to one of regions 4a to 4d, i.e. by comparing the
6 position of cursor 8 to the values stored in memory corresponding to the location of
7 regions 4. (This memory can be memory 58 or another memory within the system.)

8 As mentioned above, the image displayed on screen 2 can be annotated with
9 active areas. The locations of these active areas (and the links associated with the active
10 areas) are also stored in the above-mentioned memory (e.g. memory 58). Microprocessor
11 52 (or the above-mentioned other hardware) also compares the position of cursor 8 with
12 the locations of these other active areas. However, microprocessor 52 (or the other
13 hardware within the system) also ascertains whether these other active areas are masked
14 by the template (e.g. regions 4a to 4d). If the cursor is moved over an active area which
15 is masked by region 4a, for example, microprocessor 52 ascertains that the link
16 associated with region 4a is to be invoked.

17 Memory 58 can store numerous templates, each of which can be activated or
18 deactivated, e.g. by controller 10. These templates can also be placed over one another.

19 While the invention has been described with respect to specific embodiments,
20 those skilled in the art will appreciate that changes can be made in form and detail
21 without departing from the spirit and scope of the invention. For example, any type of
22 display screen can be used in conjunction with the invention. For example, projection
23 video display screens, LCDs, CRTs or other types of display devices can be used.

1 Similarly, although the drawings display a screen depicting four active regions, different
2 numbers of active regions can be used.

3 Although the template of Fig. 1 permits active areas within region 6 to be
4 activated, in other embodiments, only the active areas of the active template itself can be
5 activated.

6 As mentioned above, in one embodiment video system 1 displays various images
7 in regions 4a to 4d. In one embodiment, these images can be applied to regions 4a to 4d
8 using a method discussed in U.S. Patent Application 09/344,442. Accordingly, all such
9 changes come within the invention.